

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) An actuator comprising:

a stator wafer;

a micro-mover above said stator wafer;

one or more stator electrodes protruding from a section of a stator wafer surface wherein said section of said stator wafer surface is a substantially flat, continuous plane that is closest to said micro-mover, and wherein said one or more stator electrodes protrude from the same flat, continuous plane on said stator wafer surface;

one or more actuator electrodes protruding from a section of a micro-mover surface, wherein said section of said micro-mover surface is a substantially flat, continuous plane that is closest to said stator wafer, and wherein said one or micro-mover electrodes protrude from the same flat, continuous plane on said micro-mover surface; and

one or more bumpers positioned on said stator wafer surface or said micro-mover surface or both surfaces, wherein ~~the number of bumpers is equal to or smaller than, the number of electrodes on the same surface~~ at least one bumper comprises a metal.

2. (Currently Amended) The actuator of claim 1, wherein said one or more stator electrodes include a first stator electrode and a second stator electrode, and wherein at least one of said one or more bumpers protrude from said stator wafer surface between said first and second stator electrodes.

Claim 3 (Previously Canceled).

4. (Previously Amended) The actuator of claim 2, said one or more bumpers protrude from said stator wafer surface at least twice as much as said one or more stator electrodes.

5. (Currently Amended) The actuator of claim 1, wherein said one or more actuator electrodes include a first actuator electrode and a second actuator electrode, and wherein at least one of said one or more bumpers protrude from said micro-mover surface between said first and second actuator electrodes.

Claim 6 (Previously Canceled).

7. (Previously Amended) The actuator of claim 5, wherein said one or more bumpers protrude from said micro-mover surface at least twice as far as said one or more actuator electrode.

8. (Currently Amended) The actuator of claim 1, wherein said ~~one or more bumpers comprise~~ at least one bumper is further comprises of a metal and a dielectric.

Claims 9 - 20 (Previously Canceled).

21. (Previously Added) The actuator of claim 1, wherein said one or more bumpers are positioned on both said stator wafer surface and said micro-mover surface.

22. (Currently Added) The actuator of claim 1, wherein the metal of said at least one bumper is electrically grounded.

23. (Currently Added) The actuator of claim 1, wherein said one or more bumpers comprise a plurality of discreet posts, and wherein the number of bumpers is equal to or smaller than, the number of electrodes on the same surface.

24. (Currently Added) The actuator of claim 23, wherein said plurality of discreet posts are positioned on said stator wafer surface or said micro-mover surface to form a triangular pattern across the same surface.

25. (Currently Added) The actuator of claim 23, wherein said plurality of discreet posts are positioned on said stator wafer surface or said micro-mover surface to form a square pattern across the same surface.

26. (Currently Added) The actuator of claim 1, wherein said one or more bumpers comprises at least one bumper overlying at least a portion of at least one of said stator electrodes or said actuator electrodes.

## REMARKS

After entry of this amendment, claims 1, 2, 4, 5, 7, 8 and 21 - 26 are pending in the application, claims 3, 6 and 9-20 having been previously canceled, and claims 22-26 having been added.

By this amendment, claims 1, 2, 5 and 8 have been amended. The amendments and added claims are fully supported by the specification, drawings and claims as originally filed.

In particular:

(a) amendments to claim 1 are supported, inter alia, claim 8 and by the specification at page 9, lines 13-15, as originally filed;

(b) amendments to claims 2 and claim 5 are supported, inter alia, by FIG. 4 (which illustrates that least one of said plurality of discrete posts protrude from the stator wafer surface between first and second stator electrodes), and by the specification page 7, lines 13 to 16 (which describes the bumpers as positioned on the stator or micro-mover between the stator or actuator electrodes);

(c) added claim 22 is supported, inter alia, by the specification at page 9, lines 13-15;

(d) added claim 23 is supported, inter alia, specification at page 8, lines 5 to 12, and by FIGs. 6A and 6B (which illustrate the bumpers 120 as a plurality of discrete posts, pillars or columns);

(e) added claims 24 and 25 are supported, inter alia, by the specification at page 8, lines 5 to 12, and by FIGs. 6A and 6B; and

(f) added claim 26 is supported, inter alia, by the specification at page 9, lines 1-6, and FIGs. 7A and 7B.

No new matter is added and entry of the amendments and added claims is respectfully requested.

## **I. ELECTION/RESTRICTIONS**

The Examiner states that the limitations of claims 11-20 are drawn to an invention non-elected with traverse in Paper No. 4. Without admitting the propriety of the Examiner's action, applicant hereby cancels and withdraws without prejudice from consideration claims 11-20 as being directed to a non-elected invention to advance the remaining claims to allowance.

## **II. REJECTION OF THE CLAIMS UNDER § 103**

The Examiner rejected claims 1, 2, 5, 8 and 21 under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent JP08-051786 to Narita et al, hereinafter NARITA. The Examiner further rejected claims 4 and 7 under 35 U.S.C. 103(a) as being unpatentable over NARITA in view of U.S. Patent 5,604,392 to Vig, hereinafter VIG.

The Examiner suggests that NARITA discloses all elements of the claimed invention except the number of bumpers being equal to or smaller than, the number of electrodes. The Examiner further suggests that VIG discloses two stator electrodes with a number bumpers, i.e., one, being smaller than the number of electrodes.

Under the Graham test, three factors must be evaluated in considering obviousness under §103: the scope and content of the prior art; the differences between the prior art and the claimed invention; and the level of ordinary skill in the art (MPEP 706). Moreover, to establish a prima facie case of obviousness under 35 U.S.C. §103, three basic criteria must be met: (1) the prior art must provide one of ordinary skill with a suggestion or motivation to modify or combine the teachings of the references relied upon by the Examiner to arrive at the claimed invention; (2) the prior art must provide one of ordinary skill with a reasonable expectation of success; and (3) the prior art, either alone or in combination, must teach or suggest each and every limitation of the rejected claims. The teaching or suggestion to make

the claimed invention, as well as the reasonable expectation of success, must come from the prior art, not Applicant's disclosure. In re Vaeck, 20 USPQ2d 1438 (Fed. Cir. 1991); M.P.E.P. §706.02(j).

**The Invention:**

The claimed embodiments of the invention are directed to an actuator for use in, among other things, sensors and data storage devices. The actuator includes a stator wafer and a micro-mover positioned adjacent to the stator wafer. Between the stator wafer and the micro-mover are electrodes that emanate electric fields that position the micro-mover relative to the stator wafer. Also between stator wafer and the micro-mover are a plurality of bumpers that prevent the electrodes from coming into contact with each other. The bumpers are positioned on a surface of the stator wafer, the micro-mover or both, and include a plurality of discreet posts, pillars or columns. The number of bumpers is equal to or smaller than, the number of electrodes on the same surface.

**The Cited Prior Art:**

NARITA is directed to an actuator in which the frictional resistance between a movable element and stator is reduced so that the actuator can move at high speed. To accomplish this, space between the movable element and stator is filled with oil, and surface of insulators of the movable element and stator consist of a porous body or layers treated or impregnated with an insulating lubricating oil. The porous body or layers are either Alumite treated layers 14 or Porous PTFE film 15. The electrodes 12, 22, of the movable element and stator are formed in grooves 13, 23, ion etched in the surfaces of the porous body or layers 14, 15.

VIG is directed to a crystal resonator consisting of a housing having a cavity therein, two ring shaped levitation electrodes disposed within the cavity, and a bumper, such as a micromechanical spring attached to the cavity. (Col. 3, line 15, to col. 4, line 21).

**Differences Between The Prior Art And The Claimed Invention:**

The claimed invention differs from the cited prior art and applicant respectfully disagrees with the basis for rejection. Nevertheless to facilitate prosecution toward allowance, applicant has amended the pending claims to further emphasize the distinguishing limitations of the actuator of the present invention over the cited references.

Applicant submits that claims 1, 2, 4, 5, 7, 8 and 21, are not obvious over the cited references because the cited references, alone or in combination, do not teach or suggest, each and every limitation of the claims as amended.

**Claim 1**

In particular, claim 1 as amended includes the limitation of one or more bumpers positioned on said stator wafer surface or said micro-mover surface or both surfaces, wherein at least one bumper comprises a metal.

Furthermore, as seen in FIGs. 1-6 and described inter alia in paragraph 0007 of NARITA, Alumite treated layers 14 or Porous PTFE film 15 are ion etched to form groove parts 13, 23. Thus, the apparent raised portions of the layers 14, 15 or bumpers in NARITA are formed entirely from Alumite treated layers 14 or Porous PTFE film 15. Both materials are dielectric. Thus, NARITA does not teach or suggest a plurality of bumpers including at least one bumper comprising a metal. VIG does not teach or suggest a material for the bumper at all, still less that at least one bumper include a metal and a dielectric.

Thus, the Applicant submits that NARITA does not teach or suggest a plurality of bumpers comprising a plurality of discreet *posts*, wherein *the number of bumpers is equal to or less than the number of electrodes*, and that VIG does not teach or suggest a *plurality* of bumpers or posts.

Accordingly, the Applicant submits that the cited references, alone or in combination, do not teach or suggest, each and every element in claim 1 as amended, and respectfully requests the rejection be withdrawn, and that claim 1 and claims 2, 5, 8 and 21-26 which are dependent therefrom be allowed.

#### **Added Dependent Claims 22-26**

In addition to the reasons provided above for base claim 1, Applicant submits that added dependent claims 22-26 include additional elements not set forth in the cited references and are therefore patentable over the cited references.

In particular, with respect to claim 22, Applicant submits that the cited references, alone or in combination, do not teach or suggest “wherein the metal of said at least one bumper is electrically grounded”. As noted above, NARITA discloses the bumpers are formed by dielectric materials, and VIG does not teach or suggest a material for the bumper at all, still less that at least one bumper include a metal and a dielectric. Moreover, Applicant further submits that the cited references, alone or in combination, do not teach or suggest a plurality of bumpers including at least one bumper comprising a metal wherein the metal is electrically grounded, as provided in added claim 22.

With respect to added claim 23, Applicant submits that the cited references, alone or in combination, do not teach or suggest a ““a plurality of bumpers positioned on said stator wafer surface or said micro-mover surface or both surfaces, wherein said plurality of bumpers comprises *a plurality of discreet posts* wherein the number of bumpers is equal to or smaller



than, the number of electrodes on the same surface”. It should be noted that by virtue of this limitation, whichever surface the plurality of bumpers are positioned on (i.e., the stator surface or the micro-mover surface) the electrodes would by virtue of this limitation have to include at least two electrodes, while the other surface could include one or more electrodes as provided in the preceding limitations.

Furthermore, as seen in FIGs. 1-6 and described inter alia in paragraph 0007 of NARITA, Alumite treated layers 14 or Porous PTFE film 15 are ion etched to form groove parts 13, 23. Thus, the apparent raised portions of the layers 14, 15 in NARITA form series of parallel lines extending across the entire length or width of the moving part. Indeed, as noted in paragraph 0006 of NARITA the grooves are formed using “stainless steel mask plates in which rectangular holes with a width of 60  $\mu\text{m}$  were formed at a spacing of 60  $\mu\text{m}$ ”. It can be concluded that both grooves 13, 23, and the resulting raised portions have a groove shape corresponding to the holes in the mask, that is raised parallel lines or rectangles, and not that of a plurality of discreet posts.

Moreover, as acknowledged by the Examiner, NARITA does not teach the number of bumpers being equal to or less than the number of electrodes. However, the Examiner goes on to suggest that “Vig teaches two stator electrodes with one bumper (figure 2).”

Thus, the Applicant submits that NARITA does not teach or suggest a plurality of bumpers comprising a plurality of discreet *posts*, wherein *the number of bumpers is equal to or less than the number of electrodes*, and that VIG does not teach or suggest a *plurality* of bumpers or posts.

Similarly, with respect to added claim 24, Applicant submits that the cited references, alone or in combination, do not teach or suggest a “plurality of discreet posts are positioned on said stator wafer surface or said micro-mover surface to form a triangular pattern across the same surface”. As noted above, NARITA does not teach or suggest discreet posts, and

VIG does not teach or suggest a *plurality* of bumpers or discreet posts. Moreover, Applicant submits that the raised portions or bumpers in NARITA have a rectangular or parallel line shape corresponding to the holes in the mask, and not that of discreet posts. VIG does not teach or suggest either (i) a sufficient number of bumpers or (ii) a positioning on said stator wafer surface or said micro-mover surface to form a triangular pattern across the same surface.

Similarly, with respect to added claim 25, Applicant submits that the cited references, alone or in combination, do not teach or suggest a “plurality of discreet posts are positioned on said stator wafer surface or said micro-mover surface to form square pattern across the same surface”. The rationale is the same as that provided relative to claim 24 and not repeated here.

Finally, with respect to added claim 26, Applicant submits that the cited references, alone or in combination, do not teach or suggest a “plurality of bumpers comprises at least one bumper overlying at least a portion of at least one of said stator electrodes or said actuator electrodes”. As noted above, the electrodes 12, 22, of the movable element and stator are formed in grooves 13, 23, ion etched in the surfaces of the porous body or layers 14, 15. As also noted above, VIG actually teaches away from the claimed invention by teaching a bumper on the wall of the enclosure or housing, and levitation electrodes disposed within a cavity of the housing, so that resonator plate can touch the bumper only outside the active region (Col. 3, line 15, to col. 4, line 21). Thus, the bumpers of NARITA and VIG cannot include one overlying at least a portion of at least one of the electrodes.

Accordingly, the Applicant submits that the cited references, alone or in combination, do not teach or suggest, each and every element in each of the dependent claims 22 - 26, and respectfully requests the rejection be withdrawn, and that claims 22 – 26 be allowed.

## CONCLUSION

Applicant respectfully requests reconsideration of the above-identified application in view of the preceding remarks and exhibits.

In the event that the Examiner identifies any other issues that would preclude issuing a Notice of Allowance, the courtesy of a telephone call to the undersigned attorney would be appreciated.

The Commissioner is authorized to charge any additional fees, such as fees for extension of time and claims added herein but not otherwise paid for, to Deposit Account No. 08-2025 (Order No. HP 10012246-1).

Respectfully submitted,

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